



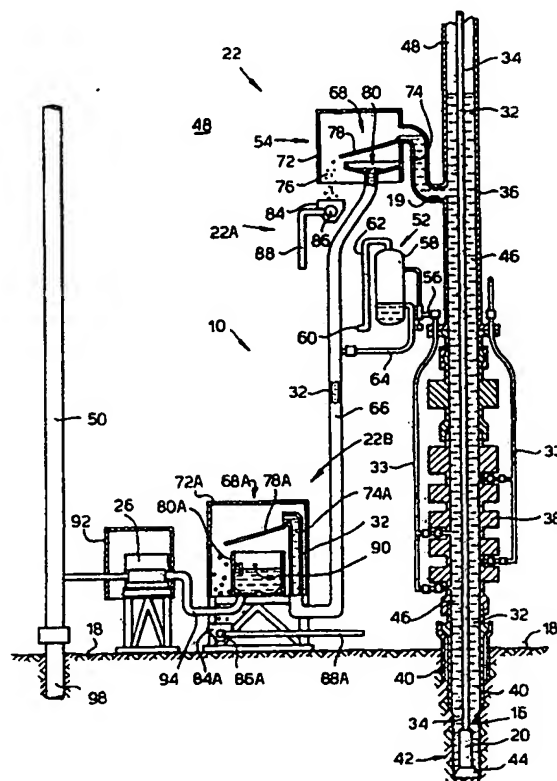
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : E21B 21/06, 21/00, 21/10		A3	(11) International Publication Number: WO 99/15758
			(43) International Publication Date: 1 April 1999 (01.04.99)
(21) International Application Number: PCT/EP98/06181			(81) Designated States: BR, GB, ID, MX, NO, OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>
(22) International Filing Date: 25 September 1998 (25.09.98)			
(30) Priority Data: 60/060,042 25 September 1997 (25.09.97) US 60/060,031 25 September 1997 (25.09.97) US 60/060,032 25 September 1997 (25.09.97) US			
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			(88) Date of publication of the international search report: 1 July 1999 (01.07.99)

(54) Title: SUBSEA DRILL FLUID PUMPING AND TREATMENT SYSTEM FOR DEEPWATER DRILLING

(57) Abstract

A method is disclosed for offshore drilling in which a bit (44) is driven at a far end of a drill string (34), drilling fluid (32) is injected into the drill string from surface drilling facilities, and drilling fluid flushes the borehole (16) at the bit and entrains drill cuttings (76). The drilling fluid is drawn off near the mudline and is treated through a subsea processing system (22) to remove the cuttings from the drilling fluid. The treated drilling fluid is then returned to the surface with a subsea return pump system (26) and passed to surface drilling facilities for injection and recirculation.



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INTERNATIONAL SEARCH REPORT

International Application No

PC1/EP 98/06181

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 6 E21B21/06 E21B21/00 E21B21/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 E21B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 134 461 A (BLOMSMA EVERHARD C) 16 January 1979 see abstract see column 1, line 66 - column 2, line 7 see column 3, line 48-59 see column 4, line 11-17 see figure 1 ---	1,3,7,9
A	US 4 813 495 A (LEACH COLIN P) 21 March 1989 cited in the application see abstract ---	1,9
A	US 4 149 603 A (ARNOLD JAMES F) 17 April 1979 see abstract -----	1,9

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

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- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

16 February 1999

Date of mailing of the international search report

11.05.1999

Name and mailing address of the ISA

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 98/06181

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4134461 A	16-01-1979	GB 1546919 A	31-05-1979
US 4813495 A	21-03-1989	CA 1305469 A	21-07-1992
		DK 237488 A	06-11-1988
		EP 0290250 A	09-11-1988
		JP 63284397 A	21-11-1988
US 4149603 A	17-04-1979	NONE	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP 98/06181

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-7,9

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

1. Claims: 1-7,9

A system and method of drilling an offshore borehole using a subsea processing system for removing cuttings from the drilling fluid.

2. Claims: 8,10

A pressure activated drill string shut-off valve.